

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
13 January 2005 (13.01.2005)

PCT

(10) International Publication Number  
**WO 2005/004221 A3**

(51) International Patent Classification<sup>7</sup>: **H01L 21/312**,  
C23C 16/40

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(21) International Application Number:  
**PCT/FI2004/000440**

(22) International Filing Date: 8 July 2004 (08.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/485,114 8 July 2003 (08.07.2003) US  
60/531,672 23 December 2003 (23.12.2003) US

(71) Applicant (for all designated States except US): **SILECS OY [FI/FI]**; Tietotie 3, FIN-02150 Espoo (FI).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **RANTALA, Juha [FI/FI]**; c/o Silecs Oy, Tietotie 3, FIN-02150 Espoo (FI).

(74) Agent: **SEppo LAINE OY**; Itämerenkatu 3 B,  
FIN-00180 Helsinki (FI).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:

2 June 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2005/004221 A3

(54) Title: LOW-K-DIELECTRIC MATERIAL

(57) Abstract: Method for forming a low dielectric constant structure on a semiconductor substrate by CVD processing. The method comprises using a precursor containing chemical compound having the formula of  $(R1-R2)_n-Si-(X1)4-n$ , wherein X1 is hydrogen, halogen, acyloxy, alkoxy or OH group, R2 is an optional group and comprises an aromatic group having 6 carbon atoms and R1 is a substituent at position 4 of R2 selected from an alkyl group having from 1 to 4 carbon atoms, an alkenyl group having from 2 to 5 carbon atoms, an alkynyl group having from 2 to 5 carbon atoms, Cl or F; n is an integer 1-3. The present precursors allow for a lowering of the electronic dielectric constant compared to conventional dielectric materials, such as silicon dioxide or phenyl modified organo-containing silicon dioxide.